STANDARD/SPECIFICATION	NUMBER
TIN-FREE PRESSURE-WORKED BRONZE. GRADES.	GOST 18175-78
	SUPERSEDES GOST 18176-72
	SHT 1 OF 9

1. This standard pertains to tin-free pressure-worked bronze, meant for fabrication of blanks and semifinished products.

This standard corresponds to ST SEV 377-76 in the part of grades BrA6, BrA7, BrAMц9-2, BrAŻNMц10-3-1.5, BrAŻN10-4-4, BrB2, BrBNT1.7, BrBNT1.9, BrKMц3-1 and establishes additional requirements to grade BrAŻ9-4 in the part of content of lead and phosphorous and also establishes the grades BrAMц10-2, BrBNT1.9Mg, BrKN1-3, BrMц5, BrAŻNMц9-4-4-1, BrOb1 and BrMg0.3.

2. Chemical composition of alloys should correspond to the requirements, given in the table.

3. Impurities, which are not to be determined and not given in the table, are considered in total content of impurities.

4. Properties and purpose of tin-free pressure-worked bronze, are given in(recommended) appendix 1.

5. Types of semi-finished products are given in(reference) appendix 2.

.....2/-

SPJ/-

APPROVED		11-1	MATL/SPECN.			
ENGINEER GP. INCHARGE			HEAT TREAT			
CHECKED	(A.G.UDHAVRAO)	6.2.84.	FINISH			
DRAWN				ISS NO.	ISSD. BY	APPRD.

TIN-FREE PRESSURE-WORKED BRONZE GRADES.

Designation of grade		Chemical composition, in %							
		Parts of basic components (by weight):							
As per this standard	As per standard SEV 377-76	Aluminium	Beryllium	Iron	Manganese	Nickel	Silicon	Titanium	Cadmium
1	2	3	4	5	6	7	8	9	10
BrA5	CuAl5	4.0-6.0	-	-	-	-	-	-	-
BrA7	CuAl8	6.0-8.0	-	-	-	-	-	-	-
BrAMц9-2	CuAl9Mn2	8.0-10.0	-	-	1.5-2.5	-	-	-	-
BrAMц10-2	-	9.0-11.0	-	-	1.5-2.5	-	-	-	-
BrAZH9-4	CuAl9Fe4	8.0-10.0	-	2.0-4.0	-	-	-	-	-
BrAZHMц10-3-1.5	CuAl10Fe3Mn1	9.0-11.0	-	2.0-4.0	1.0-2.0	-	-	-	-
BrAZHN10-4-4	CuAl10Fe4Ni4	9.5-11.0	-	3.5-5.5	-	3.5-5.5	-	-	-
BrB2	CuBe2Ni(Co)	-	1.8-2.1	-	-	0.2-0.5	-	-	-
BrBNT1.7	CuBe1.7NiTi	-	1.60-1.85	-	-	0.2-0.4	-	0.10-0.25	-
BrBNT1.9	CuBe2NiTi	-	1.85-2.10	-	-	0.2-0.4	-	0.10-0.25	-
BrBNT1.9Mg	-	-	1.85-2.10	-	-	0.2-0.4	-	0.10-0.25	-
BrKMц3-1	CuSi3Mn1	-	-	-	1.0-1.5	-	2.7-3.5	-	-
-	-	-	-	-	-	-	-	-	....3/-

Table Contd..

1	2	3	4	5	6	7	8	9	10
[illegible]	-	-	-	-	0,1-0,4	[illegible]	0,6-1,1	-	-
[illegible]	-	-	-	-	4,0-5,5	-	-	-	-
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	-	-	-	-	-	-	-	0,9-1,2
[illegible]	-	-	-	-	-	-	-	-	-

TABLE CONTD .....

Designation of grade		Chemical composition, in %											
As per this standard	As per standard SEV 377-76	Parts of basic components (by weight)		Parts of impurities (by weight), maximum									
		Magnesium	Copper	Tin	Silicon	Aluminium	Nickel	Lead	Phosphorus	Iron	Zinc	Manganese	Total
1	2	11	12	13	14	15	16	17	18	19	20	21	22
BrA5	CuAl5	-	The rest	0.1	0.1	-	-	0.03	0.01	0.5	0.5	0.5	1.1
BrA7	CuAl3	-	-"-	0.1	0.1	-	-	0.03	0.01	0.5	0.5	0.5	1.1
BrAMn9-2	CuAl9Mn2	-	-"-	0.1	0.1	-	-	0.03	0.01	0.5	1.0	-	1.5

....4/-

MAL (NK)

...WORKED BRONZE.

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Contd....

1	8	11	12	13	14	15	16	17	18	19	20	21	22
[illegible]10-2	-	-	The rest	0.1	0.1	-	-	[illegible]	[illegible]	0.8	1.0	-	1.7
[illegible]	[illegible]4	-	-"-	0.1	0.1	-	-	0.05	0.05	-	1.0	0.5	1.7
[illegible]	[illegible]10Fe3Mn1	-	-"-	0.1	0.1	-	-	0.05	0.05	-	0.8	-	0.7
[illegible]	[illegible]	-	-"-	0.1	0.1	-	-	[illegible]	0.05	-	0.8	0.2	0.6
[illegible]	[illegible]	-	-"-	-	0.10	0.10	-	0.005	-	0.15	-	-	0.5
[illegible]	[illegible]	-	-"-	-	0.10	0.10	-	0.005	-	0.15	-	-	0.5
[illegible]	[illegible]	-	-"-	-	0.10	0.10	-	0.005	-	0.15	-	-	0.5
[illegible]	-	0.07-0.15	-"-	-	0.10	0.10	-	0.005	-	0.15	-	-	0.5
[illegible]	[illegible]	-	-"-	[illegible]	-	-	[illegible]	[illegible]	-	[illegible]	[illegible]	-	[illegible]
[illegible]	-	-	-"-	[illegible]	-	[illegible]	-	[illegible]	-	[illegible]	[illegible]	-	[illegible]
[illegible]	-	-	-"-	0.1	0.1	-	-	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]
[illegible]-4-4-1	-	-	-"-	0.1	0.1	-	-	[illegible]	[illegible]	-	[illegible]	-	0.7
[illegible]	-	-	-"-	-	-	-	-	-	-	-	-	-	[illegible]
[illegible]0.3	-	[illegible]	-"-	-	-	-	-	-	-	-	-	-	[illegible]

Notes: (table)

1. Arsenic upto 0.4% (part by weight) is allowed in bronze of grade BrA5, which is used for production of condenser pipes.

2. Aluminium upto 11.5% (parts by weight) is allowed in bronze BrAZHN10-4-4, in this case iron and nickel should not be less than 4% (parts by weight) each.

3. By mutual agreement between manufacturer and customer, upto 2% of iron(without considering it in total impurities) is allowed in bronze of grade BrKMts3-1.

4. By mutual agreement between manufacturer and customer, the following may be standardised:

a) content of impurities of arsenic and antimony in bronze of grades BrA5, BrA7, BrAMts9-2, BrAMts10-2, BrAZH9-4, BrAZHMts10-3-1.5, BrAZHN10-4-4, BrAZHNMts9-4-4-1;

b) content of impurities of arsenic, antimony and phosphorus in bronze of grades BrKMts3-1 and BrKN1-3.

5. Nickel upto 0.5% (part by weight), without considering it in total impurities, is allowed in bronze of grades BrA5, BrA7, BrAMts9-2, BrAMts10-2, BrAZH9-4, BrAZHMts10-3-1.5, BrMts6.

.....6/-

Properties and approximate purpose of tin-free pressure-worked bronze.

APPENDIX 1.
(Recommended)

Type of bronze	Grade	Properties	Purpose
1	2	3	4
Aluminium bronze	BrA5 (CuAl5)	It can be formed in cold and hot state. It is corrosion-resistant, heat-resistant, abrasion-resistant.	Coins, parts coming into contact with water, parts for chemical industry.
	BrA7 (CuAl8)	It can be formed in cold state, it is heat-resistant and abrasion-resistant, partly corrosion-resistant to the action of sulphuric and acetic acids.	Parts for chemical industry, sliding contacts.
	BrAŽNMg 10-3-1.5 (CuAl10Fe3Mn1), BrAŽN10-4-4 (CuAl10Fe4Ni4) BrAŽNM 9-4-4-1	It cannot be easily formed in cold state, it can be formed in hot-state, high strength at high temperatures, corrosion-resistant, high resistance to pitting and cavitation.	Condenser tube plates, parts for chemical apparatus.

.....7/-

Appendix 1 Contd...

1	2	3	4
Aluminium bronze	BrAMn9-2 (CuAl9Mn2)	High resistance under alternating load.	Condenser tube plates, abrasion-resistant parts, screws, shafts, parts for hydraulic installations.
	BrAMn10-2	High resistance under alternating load.	Blanks, irregularly-shaped castings in ship-building.
	BrAZn9-4 (CuAl9Fe4)	High mechanical properties, excellent anti-friction properties, corrosion-resistant.	Pinions, bushes, valve seats in aviation industry, in machine-building for loam castings of heavy parts.
Beryllium bronze	BrB2 {CuBe2Ni(Co)}. BrBNT1.7 (CuBe1.7NiTi). BrBNT1.9 (CuBe2NiTi). BrBNT1.9	High strength and abrasion-resistant, high elastic properties, excellent anti-friction properties, medium electroconductivity and thermal conductivity, very good deformability in hardened state.	Springs, critical spring (action) parts, abrasion-resistant parts of all types, tools which do not emit sparks.

.....8/-

Appendix 1. Contd...

1	2	3	4
[redacted]	[redacted]	[redacted]	Parts of all types for chemical apparatus, springs and spring [redacted] parts, parts for ship-bui- [redacted] for welded structu- [redacted]
	[redacted]	[redacted]	[redacted] parts in motor-building, [redacted]
[redacted]	[redacted]	[redacted]	[redacted] articles, [redacted] high temperatures.
[redacted]	[redacted]	[redacted]	[redacted] of elect. [redacted] of [redacted] parts.

....[redacted]

TYPES OF SEMIFINISHED PRODUCTS.

APPENDIX 2. (Reference)

Grade	Sheets	Bands	Strips	Rods	Profiles	Pipes	Wire	Forgings
BrA5	X	X	X	X		X	X	
BrA7	X	X	X	X		X	X	X
BrAMц9-2		X	X	X			X	X
BrAMц10-2								X
BrAZH9-4				X		X		X
BrAZHMц10-3-1,5				X		X	X	X
BrAZHN10-4-4				X		X		X
BrB2		X	X	X		X	X	
BrBNT1.7		X	X	X		X	X	
BrBNT1.9		X	X	X		X	X	
BrBNT1.9Mg			X					
BrKMц3-1	X	X	X	X			X	
BrKN1-3				X	X			X
BrNц5								X
BrAZHNMц9-4-4-1				X				X
BrKh1					X			
BrMg0.3					X			

NOTE : The symbol " X " denotes application of the particular grade for manufacturing the indicated semifinished products.

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Other standards referred to in this standard : -

ST SEV 377-76.

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